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IS : 9000 ( Part XXV ) - 1980

*Indian Standard*

**BASIC ENVIRONMENTAL TESTING  
PROCEDURES FOR ELECTRONIC AND  
ELECTRICAL ITEMS**

**PART XXV HYDROGEN SULPHIDE TEST FOR  
CONTACTS AND CONNECTIONS**

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# Indian Standard

## BASIC ENVIRONMENTAL TESTING PROCEDURES FOR ELECTRONIC AND ELECTRICAL ITEMS

### PART XXV HYDROGEN SULPHIDE TEST FOR CONTACTS AND CONNECTIONS

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## ***Indian Standard***

# **BASIC ENVIRONMENTAL TESTING PROCEDURES FOR ELECTRONIC AND ELECTRICAL ITEMS**

## **PART XXV HYDROGEN SULPHIDE TEST FOR CONTACTS AND CONNECTIONS**

### **0. FOREWORD**

**0.1** This Indian Standard (Part XXV) was adopted by the Indian Standards Institution on 5 June 1980, after the draft finalized by the Environmental Testing Procedures Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

**0.2** The differences in environmental testing procedures for component type items and equipment type items are fast disappearing in the context of technological developments. It is, therefore, felt necessary to have uniform testing procedures wherever possible. This series of standards on environmental testing procedures (IS: 9000) has been prepared with this objective. This is also in line with the principal adopted by IEC/TC 50 'Environmental Testing' in developing unified series of standards on environmental testing procedures by International Electrotechnical Commission.

**0.2.1** It is proposed to withdraw the existing Indian Standards, namely, IS: 589-1961\* and IS: 2106† series dealing with environmental tests for electronic components and equipment respectively, as soon as the tests mentioned therein are covered in the new series (IS: 9000).

**0.3** This standard deals with the determination of the corrosive effects of hydrogen sulphide on contacts and connections.

**0.4** This standard (Part XXV) shall be read in conjunction with IS: 9001 (Part VI)-1980‡.

**0.5** In preparing this standard, assistance is derived from IEC Publication 68-2-43 (1976) 'Basic environmental testing procedures: Part 2 Tests, Test Kd: Hydrogen sulphide test for contacts and connections' issued by the International Electrotechnical Commission.

\*Basic climatic and mechanical durability tests for components for electronic and electrical equipment (*revised*).

†Environmental tests for electronic and electrical equipment.

‡Guidance for environmental testing: Part VI Hydrogen sulphide test for contacts and connections.

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**0.6** In reporting the result of a test or analysis, made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2 - 1960\*.

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### **1. SCOPE**

**1.1** This standard ( Part XXV ) covers the test intended to provide accelerated means to assess the effects of atmosphere polluted with hydrogen sulphide on the tarnishing of silver and silver alloys used for contacts and connections.

### **2. TERMINOLOGY**

**2.1** For the purpose of this standard, the definitions and explanation of terms given in IS : 9000 ( Part I ) - 1977† shall apply.

### **3. OBJECT**

**3.1** The object of this test is to determine the influence of atmospheres containing hydrogen sulphide on the contact properties of contacts made of :

- a) silver or silver alloy,
- b) silver protected with another layer, and
- c) other metals covered with silver or silver alloy.

**3.2** The major criteria of performance, in all tests, shall be the change in contact resistance caused by exposure to the atmosphere containing hydrogen sulphide.

### **4. APPLICABILITY**

**4.1** This test is not suitable as a general corrosion test, that is, it may not predict the behaviour of contacts and connections in industrial atmospheres.

### **5. TEST CHAMBER**

**5.1** The test chamber and its auxiliary parts shall be made of materials that do not react with or absorb hydrogen sulphide and which do not influence the corrosive effects of the test atmosphere. The atmosphere shall enter and leave the chamber through tubes of sufficiently large diameters such that the total flow through the chamber is at least 3, but not more than 5 changes of the atmosphere per hour. The exhaust from the chamber should not be allowed to enter the laboratory.

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\*Rules for rounding off numerical values ( revised ).

†Basic environmental testing procedures for electronic and electrical items : Part I General.

**5.2** The detailed construction of the chamber including the method of producing the test atmosphere is optional provided that the following aspects are considered:

- a) The conditions in that part of the chamber occupied by the items are within the specified limits;
- b) The items under test are protected from direct impingement of the incoming gas flow;
- c) Arrangements are made to move the items through the test atmosphere at an average rate of 20 to 60 m/h (approximately 6 to 17 mm/s) or alternatively to gently stir the atmosphere, obtaining a similar relative velocity between atmosphere and item;
- d) Condensation does not occur on the inside walls of the test chamber; and
- e) The test chamber is not exposed to direct sunlight and the level of illumination measured within the test chamber at the site of any exposed surface is 50 to 300 lux.

**5.3** An example for a suitable test chamber is given in Appendix A.

## **6. TEST ATMOSPHERE**

**6.1** The composition of the atmosphere within the test chamber shall be homogeneous and satisfy the following conditions:

- a) Hydrogen sulphide : 10 to 15 ppm ( v/v );
- b) Temperature :  $25 \pm 2^{\circ}\text{C}$  and
- c) Relative humidity :  $75 \pm 5$  percent.

## **7. INITIAL MEASUREMENTS**

**7.1** The items under test shall not be cleaned in any way unless specified in the relevant specification.

**7.2** The contact resistance shall be measured by the low open-circuit voltage method [ for example, see 12.1 of IS : 3826 ( Part I ) - 1966\* ] in order to avoid damage to films formed on contact surfaces.

## **8. CONDITIONING**

**8.1** Prior to the commencement of the test, suitable measurements shall be made to check the stability of the test atmosphere specified. Periodic checks shall be made during the test to ensure that these conditions are maintained.

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\*Specification for connectors for frequencies below 3 Mc/s : Part I General requirements and tests.

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**8.2** The items shall be so placed that they do not come into contact with one another and that they do not shield one another from the test atmosphere.

**8.3** Adequate precautions shall be taken to ensure that the contacts are not disturbed during the exposure period.

**8.4** Items shall be exposed with contacts open and/or closed, as prescribed in the relevant specification.

**8.5** The loading or functioning of the items should be permitted when specified in the relevant specification.

**8.6** The items shall be continuously exposed to the conditioning atmosphere for 4, 10 or 21 days, as required by the relevant specification.

### **9. RECOVERY**

**9.1** The items shall be removed from the chamber and stored under standard recovery conditions for 1 to 2 h before contact resistance measurements are made. Adequate precautions shall be taken to ensure that the contacts are not disturbed.

NOTE — If the necessary measurements cannot be made within the specified time, the period of storage under recovery conditions may be extended to a maximum of 24 h. Such an extension shall be mentioned.

### **10. FINAL MEASUREMENTS**

**10.1** The contact resistance shall be measured. The method used for measuring the contact resistance should be the same as used for the initial measurement (*see* 7.2).

**10.2** Items which are exposed with contacts in the mated condition shall have their contact resistance measured before they are unmated. Items exposed with contacts in the unmated condition shall be mated and the contact resistance shall then be measured.

NOTE — Repeated mating and unmating is not recommended.

**10.3** Treatment of the contacts before final measurements, if required, and the details of measurements shall be as specified by the relevant specification.

**10.4** The items shall be visually inspected, if required by the relevant specification.

### **11. INFORMATION TO BE GIVEN IN THE RELEVANT SPECIFICATION**

**11.1** When this test is included in the relevant specification, the following information shall be given, wherever applicable:

- a) Measurements and checks to be made prior to the test ( *see* 7 );
- b) State of the contacts during the test, that is, mated ( closed ) or unmated ( open ) ( *see* 8.4 );
- c) Loading or functioning of the items, if applicable ( *see* 8.5 );
- d) Duration of the test ( *see* 8.6 );
- e) Measurements, checks and visual inspection to be made at the end of the test ( *see* 10 ); and
- f) Any deviation in the test procedure.

## APPENDIX A

( *Clause 5.3* )

### GENERATION OF THE CONDITIONING ATMOSPHERE

**A-1.** A typical apparatus suitable for producing the test atmosphere by directly mixing the necessary components is described in this appendix. Other apparatus and methods of mixing and control may be used provided they comply with all the requirements of this specification.

**A-2.** The test apparatus shown in Fig. 1 is composed of an air-conditioning unit, a gas supply with dosing pump, a test cabinet, a gas wash bottle for the removal of  $H_2S$  from the exhaust gases, an air flowmeter and a suction pump. The air-conditioning unit and test cabinet generally resemble commercially available climatic test cabinets. Commercially available pressure bottles of chemically pure gas, possibly diluted, may be used. The corrosive gas is mixed by way of a pressure reducing valve, a dosing pump and an injector with the flow of ( temperature controlled and humidified ) air from the air-conditioning unit. In the test cabinet, the gas is distributed uniformly by means of baffle plates. The test gas is removed from the test cabinet by the suction pump and passes through the gas wash bottle in which the corrosive gas component is removed. A freezing trap should be interposed between the gas wash bottle and the suction pump. The air flowmeter measures the airflow which is adjusted to the required value.

**A-3.** The concentration of hydrogen sulphide within the test chamber shall periodically be checked by any of the well-known analytical methods.

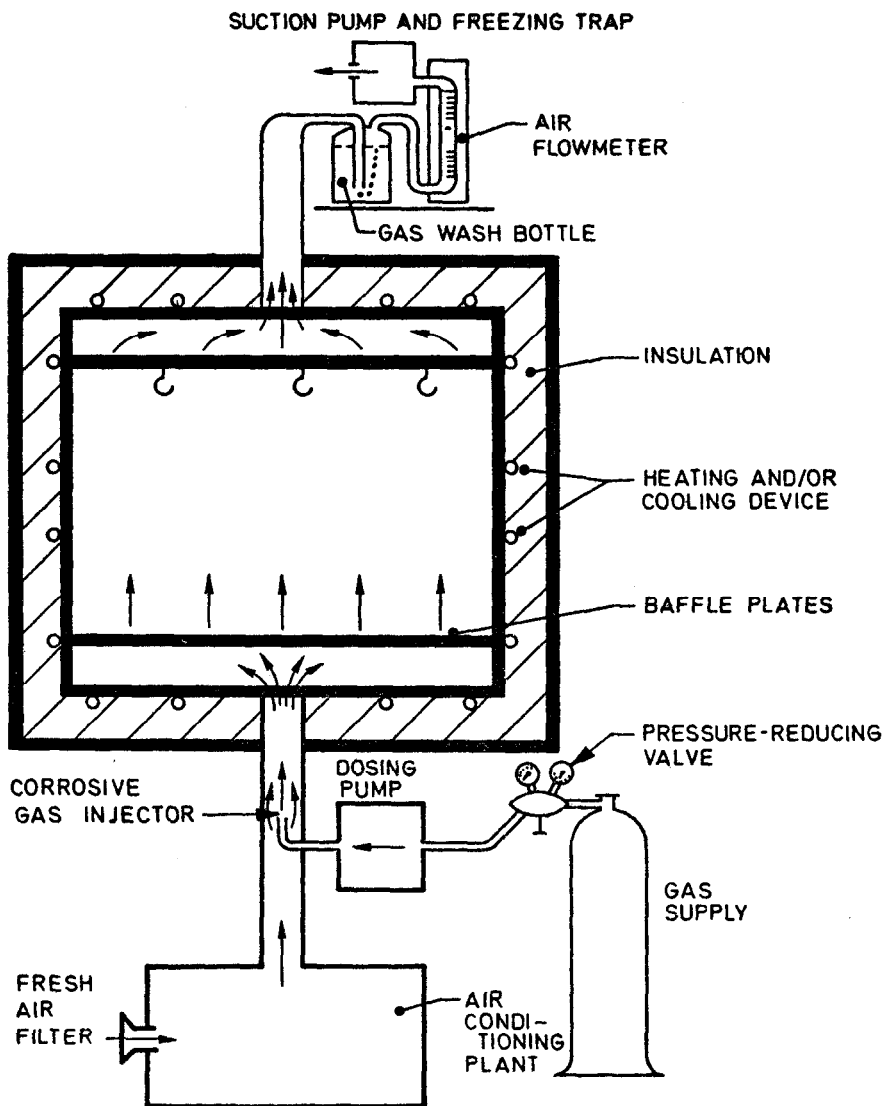


FIG. 1 SCHEMATIC DRAWING OF APPARATUS WITH GENERATION OF  
CONDITIONING ATMOSPHERE